

REMARKS

Claims 1-11 are pending and under consideration in the application. Reconsideration and allowance of the present application based on the following remarks is respectfully requested.

Claims 1-11 are rejected under 35 U.S.C 103(a) as being unpatentable over Covington et al. (U.S. Patent No. 4,502,938, hereinafter "*Covington*") in view of Gardner et al. (U.S. Patent No. 6,121,094, hereinafter "*Gardner*").

For at least the reasons stated hereinbelow, this rejection is respectfully traversed.

With respect to claim 1, the outstanding Action asserts that *Covington* teaches a semiconductor substrate, a gate oxide layer on the semiconductor substrate, an ion-selective membrane layer overlying the gate oxide layer, a source/drain in the semiconductor substrate next to the ion-selective membrane layer, a metal wire on the source/drain, and a sealing layer overlying the metal wire and exposing the ion-selective membrane layer. Additionally, the outstanding Action asserts that *Gardner* teaches a level gate structure including a gate oxide layer with an overlying tungsten oxide (WO_3) layer. The outstanding Action subsequently concludes that one of ordinary in the art would modify the teachings of *Covington* to include the WO_3 layer overlying the gate oxide layer in the gate structure, as taught by *Gardner*.

However, the present invention, as presently set forth in claim 1, requires and is characterized by forming an amorphous-Tungsten Oxide (a- WO_3) layer as the sensing membrane of the ISFET. The a- WO_3 is a non-crystalline structure, i.e., glass, having high resistivity of 10^6 to 10^{10} Ω/cm . On the other hand, the WO_3 as taught by *Gardner*,

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which is a polycrystalline or crystalline structure, has low resistivity and high conductivity.

It is known that the WO_3 takes form of several structures, and within the various structures of the WO_3 , different physical and chemical properties in terms of, e.g., resistivity and conductivity are present. As such, the properties of WO_3 change according to a change in the structure thereof. In this instance, the WO_3 as taught by *Gardner* and the a- WO_3 of the claimed invention are intrinsically different and patentably distinct, at least in terms of structure and property.

Additionally, when comparing the sensitivity of the sensing membrane in an aqueous solution with various pH values (see Figs. 6-10), the results indicate that the device made according to the claimed invention is sensitive to an acidic aqueous solution and has good linearity. For instance, an a- WO_3/SiO_2 -gated ISFET can be applied to monitor and detect industrial effluent and, in particular, acidic effluent. The ISFET can also be used to develop a bio-sensor since it is trace detectable. Particularly, a MOS structure is formed when the a- WO_3 is used as the material to detect hydrogen ions in the sensing membrane. The H^+ -detecting device also includes the properties of MOS and has excellent H^+ -detecting ability.

Referring to *Covington*, it merely teaches an ion-selective membrane layer overlying the gate oxide layer comparable to *Gardner*, which also teaches an overlying tungsten oxide layer. However, neither *Covington* nor *Gardner* teaches, or remotely suggests, using an a- WO_3 layer as the sensing membrane of the ISFET. Indeed, even assuming that one of ordinary skill would be motivated, at the time the invention was made, to modify the teachings of *Covington* to include the WO_3 layer as taught by

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Gardner and purported by the outstanding Action, such combination is not pertinent to the claimed invention since, as stated above, the α -WO₃ is different from the WO₃ both in terms of structure and properties.

Moreover, there is no motivation to combine **Covington** and **Gardner** since they are not concerned with high resistivity of 10^6 to 10^{10} Ω/cm , the sensitivity of the sensing membrane in aqueous solution with various pH values, and the properties of MOS and its excellent H⁺-detecting ability.

In view of the foregoing, neither **Covington** nor **Gardner**, individually or in combination, discloses, teaches, or remotely suggests the claimed invention as presently set forth in claim 1.

Referring to claims 2-11 which depend from claim 1, they are patentable over **Covington** and **Gardner** for at least the reasons stated above with respect to claim 1. Additionally, claim 2 requires an ISFET with a 50 μm length, 1000 μm width, and 20 width/length ratio. Since neither **Covington** nor **Gardner** teaches or suggest such limitations, claim 2 is patentable over **Covington** and **Gardner** for this additional reason.

In view of the aforementioned remarks, claims 1-11 are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

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In the event that this paper is not timely filed, the applicants respectfully petition for an appropriate extension of time. The fees for such an extension, or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 50-1299.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'J. Ho', with a long horizontal stroke extending to the left.

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